

**OPERATION AND MAINTENANCE MANUAL
FOR
WATER TRUCK FILL STATION**

1980

**HAMLET OF IGLOOLIK
BAFFIN REGION, NUNAVUT**

[illegible]

CHAPTER 1

DEPARTMENT OF PUBLIC WORKS - G.N.W.T.

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CONTRACTOR

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DESCRIPTION OF WORKS
WATER INTAKE PUMP HOUSE FACILITY
AND
SOUTH LAKE PUMP HOUSE
1979/80
IGLOOLIK, N.W.T.

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CHAPTER 3

BACKGROUND DATA

LOCATION

The Hamlet of Igloolik is situated on Igloolik Island off the northeast corner of the Melville Peninsula at coordinates 69°22'N, 81°46'W. The island is bounded to the north by the Fury and Helca Straits and separated from the Melville Peninsula by Hooper Inlet.

SITE CONDITIONS

The Hamlet is located on the shores of Turton Bay, a large body of water that constitutes the "C" shape nature of the island. The settlement is located between two buttes to the north and west both some 60 metres higher than the shoreline. The airport reservoir and pump station are located on the westerly outcrop. The soils throughout the settlement and island consist of raised marine beaches, glacial drift, and rock outcrops of paleozoic dolomite and dolomitic limestone.

PREVIOUS WATER SUPPLY

In summer, water was obtained by truck haulage from various lakes (East Lake, North Lake and Airport Lake) depending on the ice or snow conditions at each site. After Airport Lake was no longer capable of being used, the truck haulage switched to North Lake then to East Lake when winter conditions dictated. This operation continued at East Lake until the roads became impassable and then resumed when an ice road was adequate for travel. Snow and ice melting was required during severe winter conditions.

Delivery of water is by means of a 1978 Ford truck with a 4,540 litre (1,000 gal.) tank.

Basic treatment of the water was by means of batch chlorination accomplished by the driver.

ALTERNATIVE SUPPLY

For complete details on the alternative water supplies considered, reference should be made to the report prepared for the Government of the Northwest Territories entitled "Report on Water Supply System, Hamlet of Igloolik" and

BACKGROUND DATAALTERNATIVE SUPPLY (cont'd)

dated October 1978. This report is not included in this manual.

The report evaluated the following water supply alternatives:

1. Impounding of the two existing creeks within the Hamlet.
2. East Lake pumphouse complete with overland and submerged pipeline to a reservoir north of the Hamlet.
3. East Lake pumphouse with entire overland pipe line to a reservoir north of the Hamlet.
4. South Lake pumphouse and fill line to an Airport Lake reservoir complete with truck loading station.

Of the four alternatives the South Lake pumphouse and Airport Lake reservoir was selected; because it offers the best quantity and quality water for the next twenty years. This alternative was the most cost effective once the creek alternative was found unacceptable from a health point of view.

CHAPTER 3DESIGN DATA - HAMLET OF IGLOOLIKPOPULATION

752 in 1978, projected to 1,389 in the year 1998.

CLIMATE

No data is available from Environment Canada for Igloolik but the following is recorded for Hall Beach some 100 km south:

Temperature: Mean Daily February - 31.6°C

August - 4.9°C

Mean Annual - 14.0°C

Precipitation: Mean annual total precipitation is 192.3 mm with 33% falling in the form of rain.

WATER CONSUMPTION

- March 1977 to March 1978 954,076 litres (210,149 I. gal.)
- Average daily per capita consumption for 1977 was 4.54 litres (1 I. gal.). This indicates the considerable amount of snow and ice melting and the conservative use of water.
- Population and water consumption projections.

<u>Year</u>	<u>Population</u>	<u>Per Capita Daily Demand Litres</u>	<u>Total Annual Demand Cubic Metres</u>
1983	865	90.8	28,622
1988	1,015	102.2	37,830
1993	1,185	113.5	49,034
1998	1,389	124.9	63,232

- Recommended storage capacity to meet the 1998 water demand is 65,000 m³ (based on 9 months storage with 2.44 m ice cover).
- Required intake and pumping capacity with trucked water 455 l/m (100 IGPM) source.

DESIGN DATA - HAMLET OF IGLOOLIK

STORAGE RESERVOIR

For Stage 1 of development, a reservoir 35 m x 75 m x 10 m (26,250 m³) was excavated in the rock beneath Airport Lake. Based on the anticipated demand for the Hamlet, this will provide adequate storage until 1983 (based on refilling during 3 months and storing 9 months of demand). An additional portion 35 m x 25 m x 10 m deep has been blasted at the south end. Removal of this rock will extend the storage capability to meet the demand until the year 1987. After 1987, the reservoir will require enlargement to the recommended size of 65 m x 100 m x 10 m of the anticipated demands to 1998 are to be met.

The reservoir will require annual refilling during June, July and August by utilizing the South Lake pumping station and the 150 mm fill line.

TYPE OF SYSTEM

(a) Truck Fill System

Single inclined shaft consisting of a 250 mm (10 inch) insulated pipe inside a 600 mm (24 inch corrugated metal pipe. This shaft extends to within 2 m of the bottom of the excavated reservoir.

A submersible pump at the end of the shaft provides complete submergence below reservoir level under all operating conditions. A heat trace cable is provided. The low temperature thermistor is placed just below high water level in this variable water level situation, to prevent freezing at all water levels.

An externally mounted start/stop station permits the truck operator to put a measured quantity of chlorinated water into the tank truck.

A system to withdraw the pump and a spare pump has been provided. Dual heat sources (electrical and oil) have been provided for the Airport Reservoir pumphouse.

(b) Reservoir Fill System

A diesel operated 150 mm (6") pump is positioned in the South Lake pumphouse. This unit can be manually operated to refill the Airport reservoir by means of a 2,100 m, 150 mm diameter fill line before freeze up. The intake for the

DESIGN DATA - HAMLET OF IGLOOLIK

TYPE OF SYSTEM (cont'd)

(b) Reservoir Fill System (cont'd)

pump must be placed in South Lake prior to pumping and removed upon completion. Upon completion of pumping, the fill line must be completely drained to prevent damage caused by freezing.

ELECTRICAL LOAD

Continuous use thermostatically controlled	5.0 kw
Intermittant use (pumps, heat trace)	5.0 kw
Total:	<hr/> 10.0 kw + surge allowance

Available power is single phase 220 volts.

CHAPTER 4

COMPONENT FUNCTIONS

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CHAPTER 4

WATER SUPPLY SYSTEM

FOR

HAMLET OF IGLOOLIK - N.W.T.

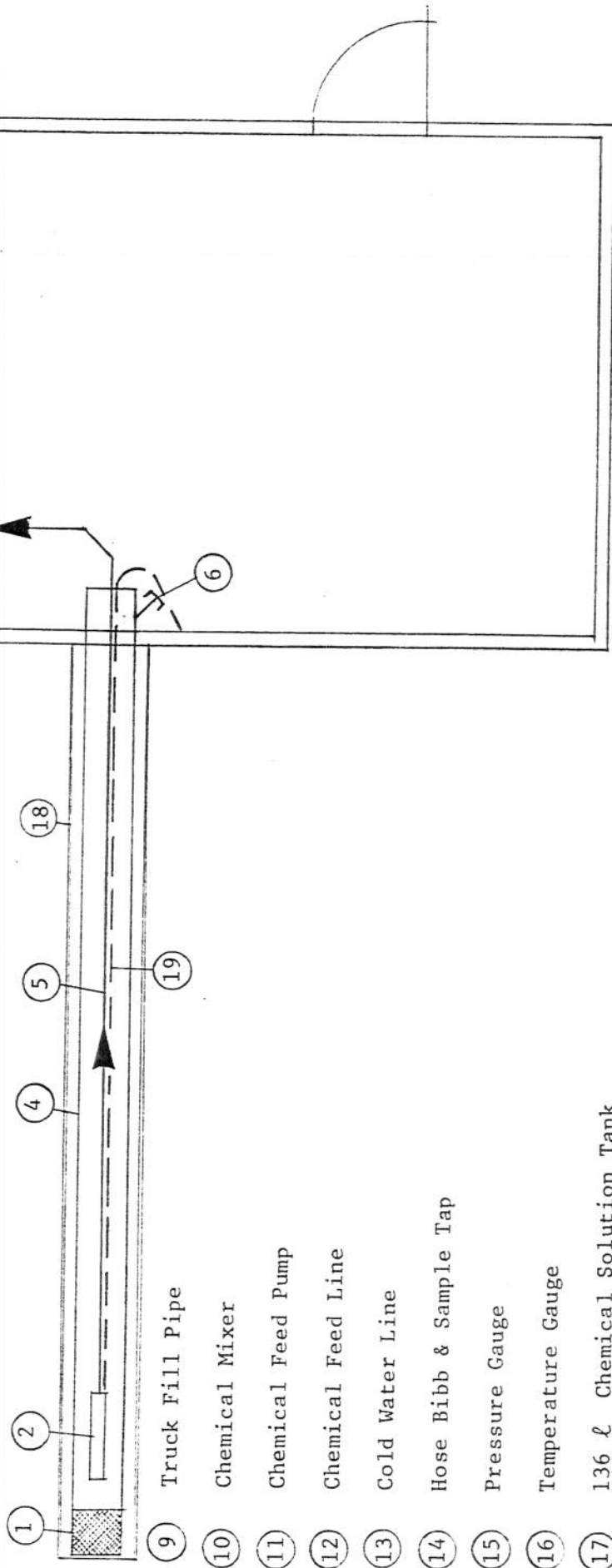
TABLE OF COMPONENT FUNCTIONS

- NOTES:
1. The numbers given are referenced to the "Flow Diagram" in Chapter 4.
 2. The numbers in the brackets refer to the "Pump House Piping and Fitting" drawing given in Chapter 5 and 6.

NO.	ITEM	LOCATION	FUNCTION PERFORMED	REMARKS
1	Intake screen	Airport Reservoir	Removal of floating debris	Standard well screen. Length 450 mm.
2	Well Pump #1	Inclined shaft.	Pumps water on demand to fill tank truck.	455 l/min. (100 IGPM) @ 375 KPa (125 ft. H ₂ O) 5 HP 3,450 RPM.
3	Well Pump #2	Pump House Building Floor	Spare Pump	455 l/min. (100 IGPM) @ 375 KPa (125 ft. H ₂ O) 5 HP 3,450 RPM.
4	250 mm diam. inclined shaft.	Airport Reservoir Ramp	Prevents water and pumps from freezing in freeze zone.	Single shaft laid on ramp with antifloatation concrete weights and earth fill. Length 46.10 m
5	89 mm Diam. Pump Discharge Pipe	Inside inclined shaft.	To carry water from well pump to Pump House.	Pipes are heat trace protected in freeze zone. Length 45.95 m
6	Fire Hose Connectors (Fitting #2)	One on inclined shaft.	For backflushing intake screens or emergency fill point for trucks.	Complete with cap and chain.
7	Gate Valve (#13)	Pump House Piping	Isolation of pump and emergency truck fill point.	
8	Water meter (Fitting #8)	Pump House Piping	Record the vol. of water pumped.	Remote resettable readout in the "Exterior Pump Control Panel".
9	Truck Fill Pipe	On wall outside Pump House	Provides final fill point for trucks.	Swivel joint permits pipe to be swung out of way when not in service.
10	Chemical Mixer (#15)	On chloride solution tank.	Provides mixing when batching chlorine solution.	Manual On-Off operation from wall switch.
11	Chemical Feed Pump (#14)	On top of chlorine solution tank.	Pumps chlorine solution into pump discharge line during truck filling.	Operation is automatic with pump operation.
12	Chemical Feed Line	Pump House wall from Chemical Pump to point of injection.	Carries chlorine solution to raw water.	
13	Cold water line and Valve (#17)	Pump House wall	Provides mixing water for batching of chlorine solution.	Manual operation. Normally closed.
14	Sample Tap and hose bib (#21)	Pump House Discharge piping	Provides sample to treated water for testing and washing floor.	Normally closed. Use only when well pump is operating.
15	Pressure Gauge (#9)	Pump House Discharge piping	Indicate pump discharge pressure.	Normal operation 3-5 p.s.i.
16	Temperature Gauge (#10)	Pump House Discharge piping	Indicate pump discharge water temperature	Should always be above 0°C.
17	136 Litre Chemical Solution tank.	Pump House Floor	Provides storage for chlorine solution.	
18	600 mm Corrugated culvert.	Airport Reservoir Ramp	Protects insulated pipe from earth and ice pressure.	Length 46.1 m
19	Heat Trace Cable	Taped to 89 mm Discharge Line	Prevent discharge line from freezing.	Heat Sensors at 1 m and 11 m Thermon Model EL-12 Cable. Length 45.5 m

SEE NEXT CHART FOR SOUTH LAKE PUMP HOUSE

- 1 Intake Screen
- 2 Pump No. 1
- 3 Pump No. 2 (Spare)
- 4 250 mm Dia. Insulated Inclined Shaft
- 5 86 mm Dia. Pump Discharge Pipe
- 6 Fire Hose Connector
- 7 75 mm Gate Valves
- 8 Water Meter



FLOW DIAGRAM - PUMP HOUSE

CHAPTER 4

WATER SUPPLY SYSTEM

FOR

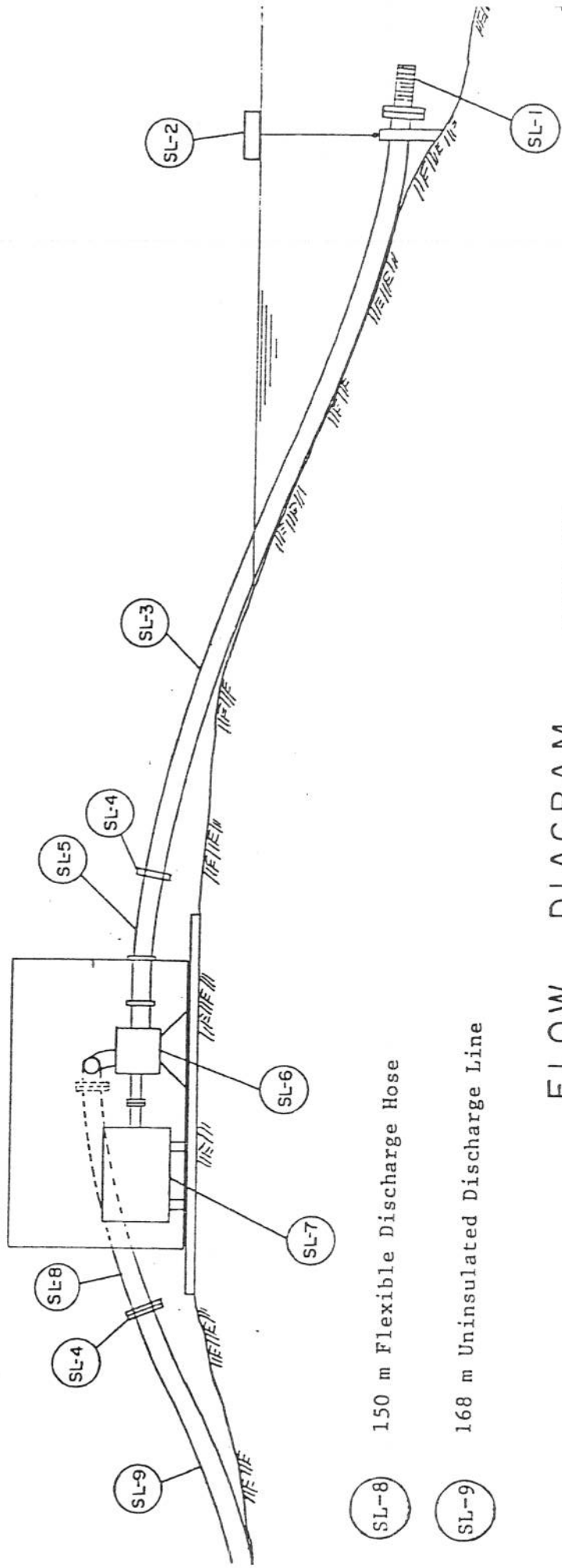
HAMLET OF IGLOOLIK - N.W.T.

TABLE OF COMPONENT FUNCTIONS

South Lake Pump House and fill line - Note the numbers given are referenced to the Flow Diagram in Chapter 4.

NO.	ITEM	LOCATION	FUNCTION PERFORMED	REMARKS
SL-1	Intake screen	South Lake	Removal of floating debris	150 mm standard well screen.
SL-2	Marker Float	South Lake	Locates end of intake to allow removal.	Styrofoam and wood box.
SL-3	168 mm dia. uninsulated intake pipe.	South Lake	Carry water from deeper area of lake to pump.	Sclairpipe laid on bottom of lake with steel weights - Removed after pumping. Length 45 m.
SL-4	150 mm quick coupler.	Intake and discharge lines.	Allows easy connections	Male and female Bayco connectors on Sclairpipe and flexible hose.
SL-5	150 mm flexible intake hose.	Intake line	Allow easy alignment of intake and pump.	Flexible rubber intake pipe has wire core to prevent collapse.
SL-6	Self priming Centrifugal Pump	South Lake Pump House	Pumps water to refill reservoir each fall if required.	1,580 l / m (350 IGPM) @ 568 kPA (190 ft. H ₂ O) 2,500 RPM
SL-7	Diesel Motor	South Lake Pump House	Drives pump and supplies 12 Volt electricity through battery.	64 hp @ 2,500 rpm
SL-8	150 mm dia. discharge hose.	Reservoir fill line.	Allows easy alignment of fill line and pump.	Flexible rubber
SL-9	168 mm dia. uninsulated discharge.	South Lake to Airport Reservoir	Carries water to Airport reservoir as required to maintain volume.	Sclairpipe must be drained after use at the Creek and South Lake Pump House by disconnecting. Length 2,085 m.

- SL-1 Intake Screen
- SL-2 Marker Float
- SL-3 168 mm Uninsulated Intake Line
- SL-4 150 m Bayco Coupler
- SL-5 150 m Flexible Intake Hose
- SL-6 Centrifugal Pump
- SL-7 Diesel Motor



- SL-8 150 m Flexible Discharge Hose
- SL-9 168 m Uninsulated Discharge Line

FLOW DIAGRAM - SOUTH LAKE

N. T. S.

CHAPTER 5

COMPONENT DETAILS

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CHAPTER 5
WATER SUPPLY SYSTEM
FOR
HAMLET OF IGLOOLIK - N.W.T.
TABLE OF COMPONENT DETAILS
RESERVOIR PUMP HOUSE

NO.	NAME/MAKE/MODEL	DATA	REMARKS
1	250 mm (10 inch) diameter intake	Capacity 454 litres/min.	
2	Well Pump No. 1 Jacuzzi submersible Model 5S6J4-S2	100 USGPM @ 125 ft. head, 2 stages, 5 HP motor 230 volt single phase.	Jacuzzi of Canada Ltd. 330 Humberline Dr. Rexdale, Ont. M9W 1R5
3	Well Pump #2 As above	As above	As above
4	250 mm dia. inclined shaft.	See attached Purchase Order	
5	89 mm dia. pump discharge pipes.	See attached Purchase Order	Westburne Limited 4590 Henri-Bourassa Blvd. Montreal, Quebec
6	Fire hose connectors		
7	Gate valves - iron body wedge.	3 inch dia. flanged.	Westburne Limited 4590 Henri-Bourassa Blvd. Montreal, Quebec
8	Water Meter - Neptune Trident Style 3	2 inch flanged See attached Purchase Order	Neptune Meters Ltd. 12455 Rue April Pointe-Aux Trembles, Que.
9	Truck fill pipe	Low Pressure Swivel Joint - standard series threaded.	
10	Chemical Mixer Wallace & Tiernan	See attached Purchase Order	
11	Chemical Feed Pump Wallace & Tiernan	See attached Purchase Order	
12	Chemical feed line	See attached Purchase Order	
13	Cold water line	See attached Purchase Order	
14	Hose-bib and sample valve	3/4 inch ballcock	See 7
15	Pressure Gauge Ashcroft Duragage Type 1279	0 to 600 kPa	See 7
16	Temperature Gauge Tel-Tru Manufacturing Co. Type 304	Stainless steel 0 to 120° C	See 7
17	Chemical Solution Wallace & Tiernan	136 litre polyethylene See attached Purchase Order	

ally Refrigeration & Canada Ltd.

Box 696

Rockville, Ontario

Box 5V1

ATTN: MR. PAUL WARREN

N1001-9-3697

RENDER SEPARATE INVOICE
EACH ORDER AND SEND 4
COPIES INCLUDING ORIGINAL
AFTER SHIPMENT

THE FOLLOWING MATERIALS AS SPECIFIED HEREIN AND CHARGE TO THE GOVERNMENT OF THE NORTHWEST TERRITORIES

INVOICE TO

GOVERNMENT OF THE NORTHWEST TERRITORIES

SUPPLY SERVICE

D.P.W. GOVT. OF N.W.T., IGLOOLIK N.W.T.

GOVERNMENT OF THE NORTHWEST TERRITORIES
SUPPLY SERVICES

BOX 70

YELLOWKNIFE, N.W.T.

SEE BELOW

F.O.B.

TENDER

DELIVERY REQUIRED BY

LA PRAIRIE, QUEBEC

6 JULY 1979

DESCRIPTION

UNIT PRICE

AMOUNT

Your Means to Eastern Canada Shipping
La Prairie, 1405 Blvd. Industrial. La Prairie
Quebec For Furtherance to Govt. of N.W.T.
DEPT OF PUBLIC WORKS, IGLOOLIK, N.W.T.

XXXXXX

4838.50 4838.50

1ea.

Self-framing pre-engineered building as
per attached specification and general
information sheets

(Ensure roof is sectionally prefabricated
for outdoor use)

NOTE: CRATING SHOULD BE SUITABLE FOR OCEAN
SHIPMENT. PER OUR TELEPHONE QUOTE AND YOUR RESPONSE
BY TELEX OF 11 JUNE 1979.

f.s.t.. exempt

DO NOT DUPLICATE- CONFIRMING ORDER,
CONFIRMING TELECON MR. PAUL WARREN AND
A. KASHYAP OF 8JUNE 1979.

Purchase Order Number N1001-9-3697 must be
shown clearly on each invoice, packing slip,
express receipt, bill of lading and on each
package, crate or carton as well as on all
relevant correspondence.

REFER ENQUIRIES TO BUYER

KASHYAP/le

QING

69/ 9/11

AMOUNT

2-1609-203226-001-855

4838.50

-1609-203226-001-313

3000.00

D.P.W. GOVT. OF N.W.T., IGLOOLIK,
N.W.T.

GOVT OF N.W.T.
TREASURY BRANCH
Posted To Commitment

JUN 25 1979

AUTHORIZED BY SUPPLY SERVICES

THIS ORDER IS SUBJECT TO THE TERMS AND CONDITIONS ON BOTH SIDES HEREOF.

34 (REV. 8/73)

PURCHASE ORDER

5-3

Du Pont Canada Incorporated (Pipe Division),
P.O. Box 660,
MONTREAL, Quebec.
H3C 2V1

ATTN: PE DUBOIS

PLEASE FURNISH THE FOLLOWING MATERIALS AS SPECIFIED HEREIN AND CHARGE TO THE GOVERNMENT OF THE NORTHWEST TERRITORIES.

SHIP TO

GOVERNMENT OF THE NORTHWEST TERRITORIES

INVOICE TO

DEPARTMENT OF PUBLIC WORKS,
IGLOOLIK, N.W.T.

GOVERNMENT OF THE NORTHWEST TERRITORIES
SUPPLY SERVICES
BOX 70,
YELLOWKNIFE, N.W.T.

SEE BELOW

SHIP VIA

DATE	F.O.B.	TENDER	DELIVERY METHOD
11 June 1979	La Prairie, Quebec		SEE BELOW
ITEM NO.	QUANTITY	DESCRIPTION	UNIT PRICE
		SHIP VIA: YOUR MEANS to Eastern Canada Shipping, 1405 Blvd. Industrial, LA PRAIRIE, Quebec. for furtherance to Government of the Northwest Territories, Department of Public Works, IGLOOLIK, N.W.T.	
		DELIVERY REQUIRED BY: On or before 7 July 1979. at Dock Site.	
1	2200 m	168 NPS Series 125, Poly ethylene Pipe, uninsulated as per attached Specifications	13.14/L 28,000.00
2	48 m	250 NPS Series 80, Polyethylene Pipe, insulated, as per attached Specifications	67.71/L 3,250.00
3	48 m	89 NPS Series 100, Polyethylene Pipe, uninsulated, as per attached Specifications	3.51/L 168.48
4	48 m	22 NPS Series 160, Polyethylene Pipe, uninsulated, as per attached Specifications	.33/L 15.84
5	3	22 NPS, Polyethylene Pipe End Caps	15.00/ea 45.00
6		Flanged Fittings for Polyethylene Pipe:	
		a) Flange Assemblies:	
	26	i) 168 NPS	46.73/ea 1,214.98
	12	ii) 250 NPS	98.66/ea 1,183.92
	2	b) 160 NPS Elbows 90 degrees	199.20/ea 398.40

CODING

REFER ENQUIRIES TO BUYER

KASHYAP/

2-1609-203226-001-855

2-1609-203226-001-313

AMOUNT

42,449.30

6,000.00

DEPARTMENT OF PUBLIC WORKS,
PROJECT 73-118,
IGLOOLIK, N.W.T.

AUTHORIZED BY SUPPLY SERVICES

Q.	QUANTITY	DESCRIPTION	UNIT PRICE	AMOUNT
4		c) 160 NPS Elbows 22-1/2 degrees	143.50/ea	574 00
4		d) 160 NPS Elbows 11-1/4 degrees	143.50/ea	574 00
4		e) 250 NPS Elbows 22-1/2 degrees	236.65/ea	1,226 60
				57,599 30
		Freight to Montreal		2,400 00
		Crating		2,450 00
				42,449 30
		<p>Per Specification attached.</p> <p>- Per our enquiry on phone and your response by telex of May 31, 1979.</p> <p>NOTE: Crating should be suitable for ocean shipment.</p> <p>F.S.T. EXEMPT</p> <p>Purchase Order Number N1001-9-3696 must be shown clearly on each invoice, packing slip, express receipt, bill of lading and on each package, crate or carton as well as on all relevant correspondence.</p> <p>Attach copy of Bill of Lading or proof of delivery to Common Carrier to invoice for prompt payment.</p> <p>DO NOT DUPLICATE - CONFIRMING ORDER, CONFIRMING TELECON MR. A. WILSON AND A. KASBYAP OF 8 JUNE 1979.</p>		

PURCHASE ORDER

AGES, INVOICES, ETC

Kopper International Canada Ltd.
1535 Chomedey,
Chomedey, Montreal, Quebec

N1001-9-3729

RENDER SEPARATE INVOICE FOR
EACH ORDER AND SEND 4
COPIES INCLUDING ORIGINAL
AFTER SHIPMENT

PLEASE FURNISH THE FOLLOWING MATERIALS AS SPECIFIED HEREIN AND CHARGE TO THE GOVERNMENT OF THE NORTHWEST TERRITORIES.

SHIP TO

GOVERNMENT OF THE NORTHWEST TERRITORIES
D.P.W. GOVT. OF N.W.T.
IGLOOLIK, N.W.T.

INVOICE TO

GOVERNMENT OF THE NORTHWEST TERRITORIES
SUPPLY SERVICES
BOX 70
YELLOWKNIFE, N.W.T.

SHIP VIA SEE BELOW

DATE		F.O.B.	TENDER	DELIVERY REQUIRED BY	
26 JUNE 1979		LA PRARIE		ON OR BEFORE 30/	
ITEM NO.	QUANTITY	DESCRIPTION		UNIT PRICE	AMOUNT
1	6 lengths	Corrugated metal culverts, galvanized 600 mm dia, 1.6 mm thickness, in 7 meter lengths		20.98/ meter	881.16
2	6	Couplers suitable for above		6.60/ea	39.60
F.S.T. EXEMPT					920.76
DO NOT DUPLICATE-CONFIRMING ORDER, CONFIRMING TELECON MR. MARK PAYETTE AND A. KASHYAP OF 26 JUNE 1979.					
NOTE: SHIP VIA: YOUR MEANS TO EASTERN CANADA SHIPPING, LA PRARIE, QUEBEC FOR FURTHERANCE TO GOVT OF N.W.T. D.P.W. IGLOOLIK, N.W.T. PROJECT 78-118					
Purchase Order Number N1001-9-3729 must be shown clearly on each invoice, pecking slip, express receipt, bill of lading and on each package, crate or carton as well as on all relevant correspondence.					
Attach copy of Bill of Lading or proof of delivery to Common Carrier to invoice for prompt payment.					
KASHYAP/1e					
REFER ENQUIRIES TO BUYER					

RECEIVED
JUN 27 1979
N. W. T. TREASURY



DING

2-1609-203226-001-855

AMOUNT

920.76

D.P.W. GOVT. OF N.W.T.
IGLOOLIK, N.W.T.

AUTHORIZED BY SUPPLY SERVICES

ORDER IS SUBJECT TO THE TERMS AND CONDITIONS ON BOTH SIDES HEREOF